

A METHOD AND SYSTEM FOR A HIGH-DENSITY PLASMA DEPOSITION  
PROCESS FOR FABRICATING A TOP CLAD FOR PLANAR LIGHTWAVE  
CIRCUIT DEVICES

5 ABSTRACT OF THE DISCLOSURE

10 A method for performing high aspect ratio gap fill during planar  
lightwave circuit top clad deposition. A plurality of waveguide cores are formed  
on a substrate, the waveguide cores having a plurality of gaps there between.  
A cladding layer is formed over the waveguide cores and the substrate using a  
15 high-density plasma deposition process. The refractive index of the waveguide  
cores are controlled by using a dopant to be higher than the refractive of the  
cladding layer. An anneal process is performed on the cladding layer after the  
high-density plasma deposition process. The gaps between the waveguide  
cores can be smaller than 2 microns. The aspect ratio of the gaps between the  
20 waveguide cores can be greater than 3. The high-density plasma deposition  
process provides a very high purity USG (undoped silica glass) and BPSG  
(Boron Phosphorous silica glass) layers having a uniform refractive index. An  
overlying layer of doped silica glass can be deposited over the HDP deposited  
layer using PECVD (plasma enhanced chemical vapor deposition) techniques.  
The doped silica glass can comprise BPSG or GeBPSG (Germanium Boron  
Phosphorous silica glass).